

PROGRESSIVE TEXAS HOLD 'EM POKER



User Manual with Mathematical Analysis

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Progressive Gaming International Corporation™

Game Manager™

Aquarius Controller™

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About This Manual

This manual describes the basic procedures to deal and play the PROGRESSIVE TEXAS HOLD 'EM POKER table game and assumes Dealers are familiar with standard poker rules.

This manual is intended for casino operators and employees, regulatory agencies, and independent governing bodies. **Operator policy and internal control procedures for processing and paying jackpots take precedence over the procedures in this manual.**

PGIC recommendations, such as hand motions, are to ensure clarity in game play and betting requirements. However, management **may alter** the procedures to suit in-house policies.

Establishing Limits on Bets and Aggregate Payouts

Casino management may choose to adhere to the following:

- Define and post separate **minimum and maximum wagering limits** for both the base game and side bet.
- Define and post (for side bet wagers only) an **aggregate limit for payouts** (maximum allowed total payout to winning Players wagering on the side bet, during a single round of play). Posting an aggregate limit protects your establishment from excessive liability in any one round of play, while allowing the Player a wider range of betting options, subject to posted aggregate limits.

Document Revision History

Revision	Description
Rev A	Updated to include "Straight or Better" (in addition to previous "Flush or Better") game play and mathematical analysis information.

Reference Documentation

Documentation for all PGIC products is available on the PGIC extranet at:

<https://extranet.progressivegaming.net>

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Chapter 1 - Game Basics

Overview

PROGRESSIVE TEXAS HOLD 'EM POKER is a community card poker game played with one standard 52-card deck. Each Player is dealt a two-card hand (hole cards) that can be used along with three or four of the community cards to create a five-card poker hand. If the best possible poker hand proves to be the five community cards, the Players and/or the Dealer may elect not to use their two-card hand and “play the board” by using all five community cards instead.

The object of the game, for Player and Dealer alike, is to make the best five-card poker hand using any combination from their two-card hand and the five community cards (board cards). There is no Player-to-Player competition; Players compare their hands to the Dealer's.

PROGRESSIVE TEXAS HOLD 'EM POKER is different from the traditional Texas Hold' em played in poker rooms. This game is played “heads-up”, meaning each Player plays against the Dealer, and the best five-card (out of seven cards) poker hand wins. For this reason, all wagers (Ante, Flop, Turn, and River) are made before the Player views the cards, each step of the way.

There is also an optional “progressive” side bet wager that is based on each Player's two-card hand (hole cards) plus the three-card Flop (first three community cards exposed). This “five-card” payable pays its two top awards according to the posted progressive signage and is held separate from the base game. Players need not win in the base game (Player vs. Dealer) to be paid on the progressive wager, provided the side bet wager was placed prior to any cards being dealt and the Player's hand in the first five cards (hole cards plus Flop) matches one of the payout hands.

Figure 1.1 PROGRESSIVE TEXAS HOLD 'EM POKER table (coin slot version show below)

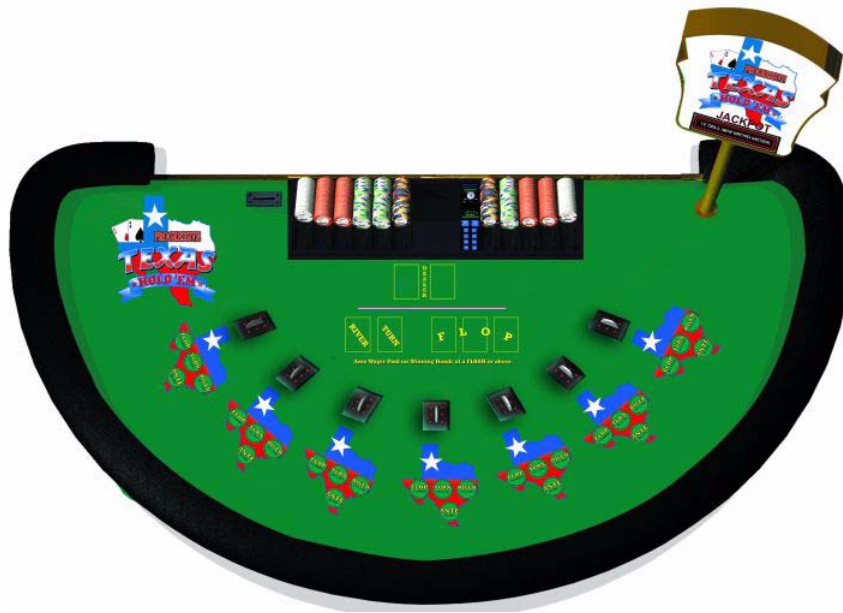


Table System Configuration

PROGRESSIVE TEXAS HOLD 'EM POKER operates in three possible configurations—two linked and one standalone.

Game Manager/Aquarius Controller System

In this linked configuration, a computer with Game Manager software acts as the master that communicates with up to 120 slave table games (30 per port), via the Aquarius Controller™ installed in each table. The Dealer uses the Dealer console at a table to communicate game activities to the Game Manager computer, which records game activity, collects game data, and issues directives to each slave table to display jackpot information and messages on the table signs. A Game Manager computer can support up to 120 PROGRESSIVE TEXAS HOLD 'EM POKER tables, whether the tables all contribute to one progressive jackpot or different ones.

Using Game Manager, casinos can configure such parameters as a game's jackpot seed amount and the currency amount for the progressive jackpot wager. Configuration information entered into Game Manager takes precedence over any Aquarius Controller settings.

Aquarius Controller Master/Slave

In this linked configuration, there is one master table game that connects with up to 29 additional slave table games via the Aquarius Controller in each table. The Dealer uses the Dealer console at a slave table to communicate game activities to the master table. The master Aquarius Controller records game activity, collects game data, and issues directives to each slave to display jackpot information and messages on the table signs.

Aquarius Controller Standalone

In this standalone configuration, each table has its own Aquarius Controller and operates independently of any other tables or controller systems. A Dealer uses the Dealer console to record jackpots, which the Aquarius Controller displays on the table sign. All default jackpot seed amounts are hard-coded (permanently written) in the EPROM chip on the Aquarius Controller board.

PGIC service personnel can adjust the starting jackpot amount and progressive wager amount if required by a casino.

Table Components

PROGRESSIVE TEXAS HOLD 'EM POKER is a progressive table game consisting of the following components:

- Seven Player positions, each containing:
 - Locations for the Ante, Flop, Turn, and River wagers
- One Dealer position containing:

- Location for the Dealer's two-card hand
- Location for the three-card Flop (community cards)
- Locations for the Turn and River card (one each community cards)
- Dealer console
- Chip tray with chip tubes (some configurations include a chip return area)
- A progressive jackpot sign that displays current progressive values and game messages

Table 1.1 Coin Acceptor LED Patterns

LED Activity	Description
All Lights Off	No Coin Present: No coin is present (when a coin drop has been completed).
Unison Flashing	Coin Placed: A coin has been placed and acknowledged and is ready to be dropped for a progressive bet. All LEDs flash in unison.
All Lights Steady	On Successful Drop: A coin was present, successfully dropped, and added to the progressive meter.
Chasing Pattern	Idle Sequence: The coin acceptor is ready for coins to be inserted. Two LEDs light at once and follow one another around the slot.
Two Corner LEDs Constant On	Coin Jam: A coin jam has occurred.
Two Center LEDs Steady On	Coin Not Registered: A coin is present but not counted when dropped.
Two Alternate Patterns Occur	Jackpot Mode: Two alternate lighting patterns occur when a jackpot is processed (one for JPH and one for JPL). The patterns are a way to draw attention to the table and add excitement to the game. They do not have any other significance.

Table Security

All PROGRESSIVE TEXAS HOLD 'EM POKER tables have a built-in Dealer console in the chip tray that has a key lock. The key lock comes with two keys and requires the correct key to make either a high or low jackpot award.

- High jackpot key (009) is used to pay a high jackpot
- Low jackpot key (008) is used to pay a low jackpot

Progressive Jackpot Wager

Each Player has the option of wagering on the progressive jackpot. At each Player position is a coin acceptor where the Player may wager on the progressive jackpot for the upcoming hand. The progressive wager does not affect the Dealer's hand. Refer to [“Chapter 2 - Recommended Game Procedures”](#) for more information.

The following rules apply to the progressive jackpot wager.

1. A Player must bet on the Ante if making a progressive jackpot wager. Only one chip may be wagered per coin acceptor per hand. The coin acceptor will acknowledge only one chip per play. A Player may not wager another chip until the beginning of the next hand (GAME OVER pressed).
2. All LEDs on the coin acceptor will light (along with the corresponding Player position LED on the Dealer console) to indicate valid progressive jackpot wagers. A hand that qualifies for the progressive jackpot will be honored only if the appropriate LEDs are on. A Player position on a PROGRESSIVE TEXAS HOLD 'EM POKER table with defective LEDs will be closed.
3. A Player choosing to play the progressive jackpot is responsible for noting that the coin acceptor LEDs are on, as posted on the table sign.
4. All progressive jackpot wagers must be placed before the Dealer delivers the cards. Before any cards are delivered, the Dealer will press COIN IN to prevent the Player from wagering after the first card is delivered.
5. After a (priority) progressive jackpot winning hand of a Royal Flush or a Straight Flush has been determined, it will be left exposed on the layout. The appropriate casino personnel will be notified regarding the possible Jackpot payoff. Any additional winning progressive jackpot hands will also be left exposed on the layout in the same fashion.
6. Before each hand is dealt, the Dealer will inform the Player that the progressive jackpot is closed by saying “No more Bets.”

Chapter 2 - Recommended Game Procedures



Depending on your jurisdiction:

- Players may be prohibited from betting between each other.
- Players may be prohibited from betting on another Player's hand.

Step 1: Initial Wagers

Players begin by placing wagers in the spot marked “Ante” (see Figure 2.1). This wager is required in order to receive a two-card hand (hole cards).

At the same time, Players have an option to place a side bet progressive wager (see [“Progressive Jackpot Wager” on page 5](#)). The side bet plays against the posted progressive payable and does not interact with Player and Dealer comparing hands for best poker rating.



Players may lose the base game wager and still collect on the side bet.

Figure 2.1 Single PROGRESSIVE TEXAS HOLD 'EM POKER spot on the table



Step 2: Dealing the Hands

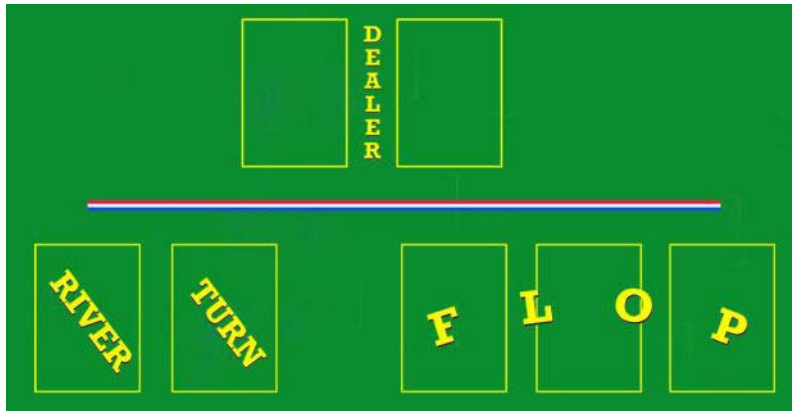
The Dealer shuffles, cuts, and proceeds to deal by hand, or delivers via an automatic shuffling machine (or by shoe, depending on regulatory requirements), a two-card hand face down to each Player occupying a “Player position” plus two cards to the Dealer position. The cards are dealt “Blackjack-style”, one card at a time, in a clockwise manner, starting to the Dealer’s left.



This dealing procedure is recommended because there is no Player advantage to act first or last in any betting situation (as there is in poker-room/pot-style Hold'em).

At the discretion of casino management, an action button (puck) may be used to designate a “first to act” position. The action button is rotated after each hand. (See [“Options for Casino Management” on page 5](#)).

Figure 2.2 Center of the PROGRESSIVE TEXAS HOLD 'EM POKER board



Step 3: Players Fold or Bet

Players review their two-card hand and decide to do one of the following without interaction or communication with any other Players:

- “Fold” by discarding their two-card hand and forfeit the Ante wager.
- “Bet” by placing a wager twice the amount of their Ante wager on the “Flop” wagering area.



When a Player “folds” that has made a Progressive wager (Slot/Spot will be lit) the Dealer will place that Player’s 2-card hand, face down, over the progressive betting slot/spot; because that Player would still be eligible for any Progressive payout as per the 5-card (Progressive) payable.

Once Players have placed both the Ante and Flop wagers they are “in for the finish” (also called the “Showdown” or the “Settling the Hands”).

Step 4: The Flop

The Dealer now “burns” (see note) one card face down and then turns over the next three cards in the deck. These community cards become the three-card Flop, also called “the Flop.” The three-card Flop remains in the center of the table for all to view and use to complete their hands.



Burning a card means to remove and discard the top card from the deck, face down. Burning the top card before turning the three-card Flop or any other community card is a Poker Room tradition that may be used at the discretion of casino management.

Step 5: The Turn

Starting from the Dealer’s left, subject to in-house procedures, the Dealer proceeds in a clockwise manner. Players elect to “check or bet” (to see the Turn Card). The Turn is the **fourth** community card.

- a. Players must bet an amount equal to their Ante wager. Each Player has the option to check (not place a wager), at which point the Dealer may place a check lammer on the Turn section of the Player’s wagering area on the layout.



The check lammer is constructive notice to Pit Supervision and Surveillance that no wager was placed on that portion of that Player’s betting area. Casino management decides if the use of check lammers is warranted, in the interest of game protection.

- b. The Dealer now burns another card (optional). The Dealer then turns the next community card up (the Turn Card) and places it in the center of the table in the area provided. The Turn Card remains in place for all to view and use.

Step 6: The River

Starting from the Dealer’s left, subject to in-house procedures, the Dealer proceeds in a clockwise manner. Players elect to check or bet (to see the River Card). The River is the **fifth** community card.

- a. Players must bet an amount equal to their Ante wager. Each Player has the option to check (not place a wager), at which point the Dealer may place a check lammer on the River section of the Player’s wagering area on the layout. Casino management has the option to use another check lammer as in Step 5.

- b. The Dealer now burns another card (optional). The Dealer then turns the last community card up and places it in the center of the table in the area provided. The River Card also remains in place for all to view and use.



At this point, there are now five community cards (all face up) in the center area for all to view and use.

Step 7: Settling the Hands: Take and Pay

- a. The Dealer turns the Dealer's own two-card hand face up and verbally announces the best possible five-card poker hand (i.e. "3 Eights", or "King-Jack", or "Ten high Straight or "Queen high Flush", etc.) using three or four of the community cards to create a five-card poker hand. If the best possible poker hand proves to be the five community cards, the Dealer may elect not to use the two-card hand and "play the board" by using all five community cards instead. The Dealer moves any community cards being used slightly forward of their designated area on the board.
- b. Starting to the Dealer's right (Blackjack-style), the Dealer turns over the first Player's two-card hand and evaluates the best possible five-card poker hand using three or four of the community cards to create a five-card poker hand. If the best possible poker hand proves to be the five community cards, the Player may elect not to use the two-card hand and "play the board" by using all five community cards instead. The Dealer verbally announces the poker ranking (i.e. "two pair Aces and Kings with a ten kicker, with a pair of Kings in the hole for a Bonus payout", etc.).
 1. The Dealer should take the Bonus wagers if they do not appear on the payable (see [Table 2.1](#) through [Table 2.7](#)), or pay the bonus as indicated on the payable.



Casino management decides at what point (dollar amount) the Dealer should notify supervision that a Bonus payout is "going out" (being made).

2. The Dealer arranges the Player's hand into the best possible poker ranking and announces the Player's "hand value."

Conditions

- If a Player's hand value and the Dealer's hand value are equal, the Dealer indicates a "Push" and moves any Flop, Turn, or River wagers to the rear of the board and slightly off the betting spot, leaving the Ante wager in place.
- If the Player's hand is a lesser value than the Dealer's hand, the Dealer takes that Player's Ante, Flop, Turn, and River wagers and places them in the bankroll tray.

- If the Player's hand is a greater value than the Dealer's hand, the Dealer pays the Flop, Turn, and River wagers even money (1 to 1). Then the Dealer should take the Progressive wagers if they do not appear on the Progressive sign-face display payable, or pay the Progressive as indicated on the same payable.

If the Player's hand is a greater value than the Dealer's hand, casino management has the following two options on the rule of payout on the Ante wager – “Flush or Better” and “Straight or Better”:



“Flush or Better”: If the Player's winning hand is a **Flush** or higher, Dealer pays the Ante wager even money (1 to 1); otherwise, Dealer and Player “push” on the Ante and the Player takes the Ante wager back.

“Straight or Better”: If the Player's winning hand is a **Straight** or higher, Dealer pays the Ante wager even money (1 to 1); otherwise, Dealer and Player “push” on the Ante and the Player takes the Ante wager back.



Progressive payouts are addressed after the “base game” wager is taken or paid, and are paid separately. Any Player position where the Player forfeited their Ante, will have their two-card hand (face down) over the Progressive betting slot/spot and the Dealer will turn over the 2-cards and compare them along with the three-card Flop against the Progressive payable (take or pay).

After the Dealer has completed the entire procedure for a Player, the Dealer can move to the next Player to the left and continue in a counterclockwise manner, addressing one Player at a time, first the Bonus wager, then the base game wager.

Options for Casino Management

- A rotating marker (action button) may be used to denote “action” or “Dealer” where the first card of each new hand is dealt to the Player to the right of the marker, also called a puck. The marker is rotated one position to the right after each hand is completed (poker room style).
- When “burning” a card prior to facing (turning over) community cards, the top card of the deck may or may not be discarded, face down (burned).
- A check lammer (placed on the appropriate area of the betting spot), used to denote a Player's option not to wager, is not required.
- If the winning hand is a Flush/Straight or higher, the Dealer pays the Ante wager even money (1 to 1) as well.

Progressive Paytables

Table 2.1 PTHA-1 PROGRESSIVE TEXAS HOLD 'EM POKER Paytable (\$1 Wager)

Hand	Pays
Royal Flush	100% of the meter
Straight Flush	10% of the meter
Four of a Kind	\$500
Full House	\$100
Flush	\$50

Table 2.2 PTHA-2 PROGRESSIVE TEXAS HOLD 'EM POKER Paytable (\$1 Wager)

Hand	Pays
Royal Flush	100% of the meter
Straight Flush	10% of the meter
Four of a Kind	\$500
Full House	\$100
Flush	\$50
Straight	\$10
Three of a Kind	\$3
Two Pair	\$2

Table 2.3 PTHA-3 PROGRESSIVE TEXAS HOLD 'EM POKER Paytable (\$1 Wager)

Hand	Pays
Royal Flush	100% of the meter
Straight Flush	10% of the meter
Four of a Kind	\$500
Full House	\$100
Flush	\$50
Straight	\$10
Three of a Kind	\$5

Table 2.4 PTHA-4 PROGRESSIVE TEXAS HOLD 'EM POKER Paytable (\$1 Wager)

Hand	Pays
Royal Flush	100% of the meter
Straight Flush	10% of the meter
Four of a Kind	\$500
Full House	\$100
Flush	\$50
Straight	\$10
Three of a Kind	\$3
Two Pair	\$2

Table 2.5 PTHA-5 PROGRESSIVE TEXAS HOLD 'EM POKER Paytable (\$1 Wager)

Hand	Pays
Royal Flush	100% of the meter
Straight Flush	10% of the meter
Four of a Kind	\$500
Full House	\$100
Flush	\$50
Straight	\$10
Three of a Kind	\$5
Two Pair	\$2

Table 2.6 PTHA-6 PROGRESSIVE TEXAS HOLD 'EM POKER Paytable (\$5 Wager)

Hand	Pays
Royal Flush	100% of the meter
Straight Flush	10% of the meter
Four of a Kind	\$2,500
Full House	\$500
Flush	\$250
Straight	\$50
Three of a Kind	\$15
Two Pair	\$10

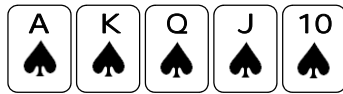
Table 2.7 PTHA-7 PROGRESSIVE TEXAS HOLD 'EM POKER Paytable (\$5 Wager)

Hand	Pays
Royal Flush	100% of the meter
Straight Flush	\$25,000
Four of a Kind	\$2,500
Full House	\$500
Flush	\$250
Straight	\$50
Three of a Kind	\$15
Two Pair	\$10

Poker Rankings

These poker hand examples illustrate poker rankings, from high value (top) to low value (bottom). Aces can be used as HIGH or LOW (straight A-2-3-4-5).

Royal Flush



The highest ranking poker hand. Five consecutive cards of the same suit, Ace through 10.

Straight Flush



All five cards are of the same suit and in sequence.

Four of a Kind



Four cards of the same rank.

Full House



Three cards of the same rank, plus two cards of the same rank.

Flush



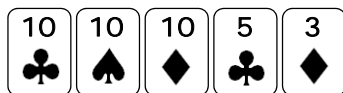
Five cards of the same suit, any rank.

Straight



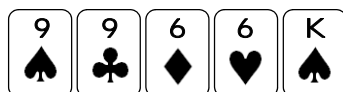
Five cards in sequence, any suit.

Three of a Kind



Three cards of the same rank.

Two Pair



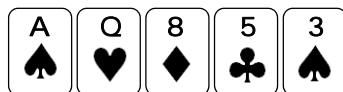
Two groups of two cards of the same rank.

One Pair



Two cards of the same rank.

High Card



No two cards of the same rank.

Summary

- Players start with an Ante wager in order to receive a two-card hand. An optional progressive Bonus Jackpot wager may be placed at this time only.
- The Dealer gives two cards to each Player, left to right, one at a time, in rotation.
- Each Player has the option to fold, forfeiting their Ante or bet. Players must make a Flop wager, twice the amount of their Ante, in order to continue.
- The Dealer places three community cards, face up, in the center of the table (board).
- Each Player now has the option to check (elect not to place a wager) or bet on the Turn with a wager equal to their Ante in order to see the fourth community card (the Turn).
- The Dealer places the fourth community card, face up, in the center of the table.
- Each Player has the option to check (elect not to place a wager) or bet on the River with a wager equal to their Ante in order to see the fifth community card (the River).
- The Dealer place the fifth, and final, community card face up in the center of the table.
- The Dealer turns his two-card hand face up in order to compare and settle the hands.
- The Dealer then turns over the first Player's two-card hand plus the three-card Flop for comparison and settlement of the Progressive wager.
- The Dealer compares each Player's combination hand (two-card hand with some or all of the five community cards) to arrive at the best possible five-card poker hand.
- The Dealer first collects all wagers where the Player's combination hand is a lesser ranking poker value than the Dealer's five-card combination hand.
- The Dealer then pays the Flop, Turn, and River wagers, where the Player's combination hand is of a greater ranking poker value than the Dealer's five-card combination hand. Dealer does not pay the Ante wager unless the Player's winning hand is a Flush/Straight or higher.

If the Player's hand is a greater value than the Dealer's hand, casino management has the following two options on the rule of payout on the Ante wager – “Flush or Better” and “Straight or Better”:



“Flush or Better”: If the Player's winning hand is a **Flush** or higher, Dealer pays the Ante wager even money (1 to 1); otherwise, Dealer and Player “push” on the Ante and the Player takes the Ante wager back.

“Straight or Better”: If the Player's winning hand is a **Straight** or higher, Dealer pays the Ante wager even money (1 to 1); otherwise, Dealer and Player “push” on the Ante and the Player takes the Ante wager back.

- Player and Dealer hands of the same value may be considered a push (no action).

Chapter 3 - Progressive Jackpot Payout Procedures

Progressive Payout Structure

The following tables list the progressive hands and corresponding payout amounts for PROGRESSIVE TEXAS HOLD 'EM POKER. Progressive hands are paid regardless of the Dealer's hand.

Table 3.1 PTSA-1 PROGRESSIVE TEXAS HOLD 'EM POKER Pay Schedule (\$1 Wager)

Progressive Hand	Jackpot Amount (from the meter)	Jackpot Type (key turns)
Royal Flush	100% (from the meter)	High (JPH - turn to right)
Straight Flush	10% (from the meter)	High (JPH - turn to right)
Four of a Kind	\$500 (from the meter)	Low (JPL - turn to left)
Full House	\$100 (from the meter)	Low (JPL - turn to left)
Flush	\$50 (from the meter)	Low (JPL - turn to left)

Table 3.2 PTSA-2 PROGRESSIVE TEXAS HOLD 'EM POKER Pay Schedule (\$1 Wager)

Progressive Hand	Jackpot Amount (from the meter)	Jackpot Type (key turns)
Royal Flush	100% (from the meter)	High (JPH - turn to right)
Straight Flush	10% (from the meter)	High (JPH - turn to right)
Four of a Kind	\$500 (from the meter)	Low (JPL - turn to left)
Full House	\$100 (from the meter)	Low (JPL - turn to left)
Flush	\$50 (from the meter)	Low (JPL - turn to left)
Straight	\$10 (not from the meter)	No Key
Three of a Kind	\$3 (not from the meter)	No Key
Two Pair	\$2 (not from the meter)	No Key

Table 3.3 PTSA-3 PROGRESSIVE TEXAS HOLD 'EM POKER Pay Schedule (\$1 Wager)

Progressive Hand	Jackpot Amount (from the meter)	Jackpot Type (key turns)
Royal Flush	100% (from the meter)	High (JPH - turn to right)
Straight Flush	10% (from the meter)	High (JPH - turn to right)
Four of a Kind	\$500 (from the meter)	Low (JPL - turn to left)
Full House	\$100 (from the meter)	Low (JPL - turn to left)
Flush	\$50 (from the meter)	Low (JPL - turn to left)
Straight	\$10 (from the meter)	Low (JPL - turn to left)
Three of a Kind	\$5 (not from the meter)	No Key

Table 3.4 PTSA-4 PROGRESSIVE TEXAS HOLD 'EM POKER Pay Schedule (\$1 Wager)

Progressive Hand	Jackpot Amount (from the meter)	Jackpot Type (Key Turns)
Royal Flush	100% (from the meter)	High (JPH - turn to right)
Straight Flush	10% (from the meter)	High (JPH - turn to right)
Four of a Kind	\$500 (from the meter)	Low (JPL - turn to left)
Full House	\$100 (from the meter)	Low (JPL - turn to left)
Flush	\$50 (from the meter)	Low (JPL - turn to left)
Straight	\$10 (from the meter)	Low (JPL - turn to left)
Three of a Kind	\$3 (not from the meter)	No Key
Two Pair	\$2 (not from the meter)	No Key

Table 3.5 PTSA-5 PROGRESSIVE TEXAS HOLD 'EM POKER Pay Schedule (\$1 Wager)

Progressive Hand	Jackpot Amount (from the meter)	Jackpot Type (Key Turns)
Royal Flush	100% (from the meter)	High (JPH - turn to right)
Straight Flush	10% (from the meter)	High (JPH - turn to right)
Four of a Kind	\$500 (from the meter)	Low (JPL - turn to left)
Full House	\$100 (from the meter)	Low (JPL - turn to left)
Flush	\$50 (from the meter)	Low (JPL - turn to left)
Straight	\$10 (from the meter)	Low (JPL - turn to left)
Three of a Kind	\$5 (not from the meter)	No Key
Two Pair	\$2 (not from the meter)	No Key

Table 3.6 PTSA-6 PROGRESSIVE TEXAS HOLD 'EM POKER Pay Schedule (\$5 Wager)

Progressive Hand	Jackpot Amount (from the meter)	Jackpot Type (Key Turns)
Royal Flush	100% (from the meter)	High (JPH - turn to right)
Straight Flush	10% (from the meter)	High (JPH - turn to right)
Four of a Kind	\$2,500 (from the meter)	Low (JPL - turn to left)
Full House	\$500 (from the meter)	Low (JPL - turn to left)
Flush	\$250 (from the meter)	Low (JPL - turn to left)
Straight	\$50 (not from the meter)	No Key
Three of a Kind	\$15 (not from the meter)	No Key
Two Pair	\$10 (not from the meter)	No Key

Table 3.7 PTSA-7 PROGRESSIVE TEXAS HOLD 'EM POKER Pay Schedule (\$5 Wager)

Progressive Hand	Jackpot Amount (from the meter)	Jackpot Type (Key Turns)
Royal Flush	100% (from the meter)	High (JPH - turn to right)
Straight Flush	\$25,000 (from the meter)	High (JPH - turn to right)
Four of a Kind	\$2,500 (from the meter)	Low (JPL - turn to left)
Full House	\$500 (from the meter)	Low (JPL - turn to left)
Flush	\$250 (from the meter)	Low (JPL - turn to left)
Straight	\$50 (not from the meter)	No Key
Three of a Kind	\$15 (not from the meter)	No Key
Two Pair	\$10 (not from the meter)	No Key

Using the Dealer Console to Record and Pay Jackpots

Players who have a progressive jackpot winning hand must notify the Dealer of the winning hand. The Dealer must then notify the appropriate casino management and perform several steps to record and handle the transaction correctly. This section outlines Dealer procedures for paying a progressive jackpot. However, casino policy may require management personnel perform some of these actions.

Casino policy and internal control procedures take precedence over these procedures for paying any jackpot.

When a progressive jackpot occurs, the Dealer enters the information into the Game Manager system using the Dealer console keypad. After the win is verified and the Player paid, the Aquarius Controller reduces the meter to account for the jackpot win and the Game Manager system records the information in its database.

There are three progressive jackpot types—High, Low, and No Key. The following subsections detail how to perform payouts for each type of jackpot.



The Dealer pays progressive jackpot winners from right to left, in order of Player position, after taking or paying all initial wagers.

High Jackpot Payout Procedure

Refer to the appropriate payable in [“Progressive Payout Structure” on page 15](#). To make a high jackpot payout, the Dealer performs the following steps:

1. Verify that the Dealer console is in COIN IN mode. The game must be in this mode to pay jackpots.
2. Press the Dealer console button that corresponds to the winning hand. The button's red LED will light to indicate a pending jackpot.
3. Notify the appropriate casino personnel, who will:
 - a. Verify the hand(s).



If the hand is not verifiable (is not a winner), press the keypad button pressed in step 2 to cancel the jackpot payout process for that hand.

- b. Ensure the coin acceptor LEDs are on.
4. Double-check all security measures before validating the jackpot:
 - Verify that the shuffle was performed according to procedures, that qualifying progressive wagers were placed before the hand was dealt, and that cards were dealt in the correct sequence and were not manipulated in order to compose the winning hand.

- Check the winning meter amount against the last meter reading and the last Jackpot payout to determine if the winning meter amount is correct.
 - Pull and check the card deck (save the deck for further inspection).
 - Replace the card deck.
5. Count down the remaining cards, sort them into proper order, and check them. Count down the complete deck after any progressive jackpot payout.
 6. After the hand is verified, process the win by performing the following steps:
 - a. If the Player wishes to be paid by check, the Player must request this prior to the cash payoff being completed. If it is permissible, find out from the Player how the transaction is to be carried out before completing the payout slip.
 - b. Insert the 009 key and turn it from the R (Run) position to the JPH (Jackpot High) position. The J-POT button LED flashes to signify that the console is in Process Jackpot mode.
 - c. Press the flashing J-POT button to pay a pending jackpot. The controller deducts the corresponding payout amount from the progressive jackpot meter. A jackpot message scrolls across the table meter indicating a winner, the type of win, the jackpot amount, and at what table. A jackpot paid message displays on the Game Manager Activity Log.
 7. Pay the amount of the jackpot to the winning Player.
 8. After all jackpot payouts are made, turn the key back to the R (Run) position and remove the key.
 9. Press GAME OVER after all payouts are processed.
 10. Clear the jackpot in Game Manager. (Percentage jackpots cause the Process Jackpot button on the main menu to blink. When the system has finished processing a jackpot, it prints a jackpot receipt. Add this receipt to paperwork completed at the table.)

Low Jackpots

Low jackpots are fixed amounts, which the Dealer pays from the chip tray. Low jackpots also reduce the jackpot meter amount. To pay a low jackpot, follow the procedures in [“High Jackpot Payout Procedure” on page 18](#) but use the 008 key in the Dealer console and turn it from the R (Run) position to the JPL (Jackpot Low) position.

No Key Jackpot Payout Procedure

No Key jackpots are fixed amounts that the Dealer pays from the chip tray. These jackpots do not require a key to pay and some No Key jackpots reduce the jackpot meter amount. To make a No Key jackpot payment, perform the following:

1. Verify that the Dealer console is in COIN IN mode. The game must be in this mode to pay jackpots.
2. Press the Dealer console button that corresponds to the winning hand. The button's red LED will light to indicate a pending jackpot.
3. Pay the winning Player the amount of the jackpot from the chip tray.

Handling Multiple Progressive Jackpots at One Table and One Deal



PGIC recommends casinos pay all winning progressive jackpot hands one at a time according to Player position (from right to left).

For multiple progressive jackpot wins on one table, the Dealer performs the following steps:

1. Determine the first winner of a progressive jackpot from right to left.
2. Verify that the Dealer console is in COIN IN mode. The game must be in this mode to pay jackpots.
3. Press the Dealer console button that corresponds to the winning hand. The button's red LED lights to indicate a jackpot is pending.
4. Notify the appropriate casino personnel, who will:
 - a. Verify the hand.



If the hand is not verifiable (is not a winner), press the keypad button pressed in step 3 to cancel the jackpot payout process for that hand.

- b. Ensure the coin acceptor LEDs are on.
 - c. **For a high jackpot only:** Double-check all security measures before validating the jackpot.
 - Verify that the shuffle was performed according to procedures, that qualifying progressive wagers were placed before the hand was dealt, and that cards were dealt in the correct sequence and were not manipulated in order to compose the winning hand.
 - Check the winning meter amount against the last meter reading and the last Jackpot payout to determine if the winning meter amount is correct.
 - Pull and check the card deck (save the deck for further inspection).
 - Replace the card deck.
5. Count down the remaining cards, sort them into proper order, and check them. Count down the complete deck after any progressive jackpot payout.
6. After the hand is verified, process the win by performing the following steps:
 - a. **For a high jackpot only:** If the Player wishes to be paid by check, the Player must request this prior to the cash payoff being completed. If it is permissible, find out from the Player how the transaction is to be carried out before completing the payout slip.

- b. Insert the key and turn it from the R (Run) position to the JPH (Jackpot High) position. The J-POT button LED flashes to signify that the console is in Process Jackpot mode.
 - c. Press the flashing J-POT button to pay a pending jackpot. The controller deducts the corresponding payout amount from the progressive jackpot meter. A jackpot message scrolls across the table meter indicating a winner, the type of win, the jackpot amount, and at what table. A jackpot paid message displays on the Game Manager Activity Log.
7. Pay the amount of the jackpot to the winning Player.
8. After all jackpot payouts have been made, turn the key to the R (Run) position and remove the key.
9. Press GAME OVER after all payouts are processed.
10. Clear the jackpot in Game Manager. (Priority jackpots cause the Process Jackpot button on the main menu to blink. When the system has finished processing a jackpot, it prints a jackpot receipt. Add this receipt to paperwork completed at the table.)

Handling Simultaneous High Progressive Jackpot Hands on Multiple Tables



PGIC recommends casinos pay simultaneous winning high progressive jackpot hands at multiple tables according to which Player won first—as shown on surveillance tapes.

Situations can occur in which multiple 100% or 10% jackpots hit at different tables virtually simultaneously. Although it is statistically rare to have such an occurrence, it could happen. When there is more than one table linked to the same progressive, surveillance must determine which Player got the winning hand first. Winning a progressive jackpot second (and so on) means that the Player wins a smaller amount after the first jackpot reduces the meter.

In a situation where one Player wants to be paid ahead of another or insists he or she won the hand first, surveillance must be called to settle the dispute with surveillance tape evidence. The house awards the first high jackpot to the Player who won the hand first, even if by a few seconds difference.

When multiple Players win a high progressive jackpot simultaneously on different tables, the Dealer performs the following steps:

1. As soon as a dispute arises, notify the appropriate casino personnel, who will perform the following steps:
 - a. Verify that the Dealer console on all tables is in COIN IN mode. The game must be in this mode to pay jackpots.
 - b. Verify the hands.
 - c. Ensure the coin acceptor LEDs are on.
 - d. Double-check all security measures before validating the jackpot:
 - Verify that the shuffle was performed according to procedures, that qualifying progressive wagers were placed before the hand was dealt, and that cards were dealt in the correct sequence and were not manipulated in order to compose the winning hand.
 - Check the winning meter amount against the last meter reading and the last jackpot payout to determine if the winning meter amount is correct.
 - Pull and check the card deck (save the deck for further inspection).
 - Replace the card deck.
2. Count down the remaining cards, sort them into proper order, and check them. Count down the complete deck after any progressive jackpot payout.
3. After both hands are verified, perform the following steps:
 - a. At the first winner's table, press the Dealer console button that corresponds to the winning hand. The button's red LED lights to indicate a pending jackpot.

- b. If the Player wishes to be paid by check, the Player must request this prior to the cash payoff being completed. If it is permissible, find out from the Player how the transaction is to be carried out before completing the payout slip.
 - c. Insert the key and turn it from the R (Run) position to the JPH (Jackpot High) position. The J-POT button LED flashes to signify that the console is in Process Jackpot mode.
 - d. Press the flashing J-POT button to pay a pending jackpot. The controller deducts the corresponding payout amount from the progressive jackpot meter. A jackpot message scrolls across the table meter indicating a winner, the type of win, the jackpot amount, and at what table. A jackpot paid message displays on the Game Manager Activity Log.
4. Pay the first jackpot winner the full sum of the winning hand's payout.
5. Turn the key to the R (Run) position and remove the key.
6. Press GAME OVER after the first table payout is processed.
7. Clear the jackpot in Game Manager. (Priority jackpots cause the Process Jackpot button on the main menu to blink. When the system has finished processing a jackpot, it prints a jackpot receipt. Add this receipt to paperwork completed at the table.)
8. After the first jackpot payout is made, repeat the above process to pay the second jackpot winner. The second high jackpot winner will receive the new jackpot amount (the original jackpot amount less the first winner's payout).

Reconciling Progressive Meter and Coin-In Amounts

The End of Shift form on the next page is an optional tool for casinos. The main purpose of this form is to check and balance the progressive jackpot meter and coin-in amounts against the Game Manager system. Make copies of the original form and complete one for each shift. Complete and use the form as follows:

1. Fill in the date, time, shift, table #, games supervisor, and pit/shift personnel.
2. In the progressive jackpot Hard Meter section:
 - a. Enter the beginning hard meter reading amount. This is the end hard meter amount from previous shift.
 - b. Enter the end hard meter amount at the end of your shift. This is the beginning amount for the next shift.
 - c. Subtract the end amount from the beginning amount. Enter this amount in Total Hard Meter.
 - d. Multiply the Total Hard Meter amount with the progressive meter increment rate. (This rate is casino-specific.) Enter this amount in Change in progressive jackpot value.
3. Under the Current progressive jackpot Reading section:
 - a. Enter the beginning amount of the progressive jackpot. This is the end progressive jackpot amount from the previous shift.
 - b. Enter the end amount of the progressive jackpot from the LED screen on Dealer console. This is the beginning amount for the next shift.
 - c. Subtract the end amount from the beginning amount. Enter this amount in Total Current Meter.
4. Compare the Change in progressive jackpot Value with the Total Current Meter. This figure represents the correct amount of coin that was added to the progressive jackpot.

To reconcile meter amounts, run the Game Manager Coin-In, Activity Log, and progressive jackpot Reports, and compare the total progressive jackpot hard meter and current meter amounts with the amounts on these reports.



If the variance is more than 100 coins, contact PGIC Customer Service to resolve the problem (see Copyright page for contact information).

PGIC PROGRESSIVE TABLE GAMES END OF SHIFT FORM	
Date:	Shift:
Time:	Table #:
Games Supervisor:	
Pit/Shift Personnel:	
Progressive Jackpot Hard Meter	
Beginning Amount: (end amount from previous shift)	
End Amount: (beginning amount for next shift)	
Total Hard Meter: (beginning minus end)	
Change in Progressive Jackpot Value (in dollars): (Total Hard Meter times progressive increment rate)	\$
Current Progressive Jackpot Meter	
Beginning Amount: (end amount from previous shift)	
End Amount: (from LED screen on Dealer console)	
Total Current Meter: (beginning minus end)	

To reconcile meter amounts, run the Game Manager Coin-In, Activity Log, and Progressive Jackpot Reports, and compare the total progressive jackpot hard meter and current meter amounts with the amounts on these reports.

If the variance is more than 100 coins, contact PGIC Customer Service resolve the problem (see [“Contact Information” on page iii](#)).

Appendix A - Mathematical Analysis

Base Game Math Analysis - Flush or Better

There are $C_{52,2} \times C_{50,3} \times C_{47,1} \times C_{46,1} \times C_{45,2} = 1,326 \times 19,600 \times 47 \times 46 \times 990 = 55,627,620,048,000$ ways to cycle through all possible hand combinations in PROGRESSIVE TEXAS HOLD 'EM POKER. A computer program known as a combinatorial analyzer was written to deal and evaluate all of the hands in order to determine the optimal strategy and the Player expectation. The algorithm for the analysis is described below.

1. First, the analyzer cycles through all 134,459 unique five-card hand combinations.
2. For each five-card hand, draw all $C_{47,2} = 1081$ two-card hands from the remaining 47-card deck. Combine each two-card hand with this five-card hand, determine the ranking of the complete seven-card hand, and save it in computer memory.
3. For each of $C_{5,3} = 10$ three-card flops that can be drawn from this five-card hand, let the remaining two cards be the Player's hole cards, draw two separate two-card hands from the saved 1081 pairs, and let one two-card hand be the Dealer's hole cards and the other two-card hand be the 4th and 5th community cards. Determine the outcome by comparing the Player's seven-card hand and the Dealer's seven-card hand using this three-card Flop and 4th and 5th community cards.



The ranking of the Player's seven-card hand has already been determined by step 2 and therefore can simply be retrieved from the computer memory where it was saved.

Record the outcome (number of wins, losses and ties) once for each of the two community cards, since either one can be the 4th community card that affects the Player's "check or bet" strategy. Now swap the Dealer's two hole cards with the 4th and 5th community cards, repeat the comparison and record the outcomes.

4. As soon as all the 134,459 five-card hand combinations have been dealt and processed, retrieve the saved outcomes from the computer memory for each of the ten three-card flops. For each such three-card Flop, retrieve the outcomes for each of the 47 4th community cards and determine the Player's expectation. When determining the Player's expectation, assume the Player (i) made the Turn bet and (ii) checked on Turn, respectively.

Let $E(ir) = (Wr - Lr) * 5 + Wr1 * 4$ be the Player's net result for betting on the Turn and the River, where $Wr = \#$ wins, $Lr = \#$ losses, and $Wr1 = \#$ wins with less than a Flush.

Let $E(ic) = (Wc - Lc) * 4 + Wc1 * 3$ be the Player's net result for betting on the Turn and checking on the River, where $Wc = \#$ wins, $Lc = \#$ losses, and $Wc1 = \#$ wins with less than a Flush.

If $E(ir) > E(ic)$, then the strategy is to make the River bet; otherwise, the Player should check. Accumulate the outcomes derived from the chosen strategy (result).

Let $E(Ir)$ be the sum of the chosen results of $E(ir)$ and $E(Ic)$ be the sum of the chosen results of $E(ic)$.

Next, let $E(iir) = (Wr - Lr) * 4 + Wr1 * 3$ be the Player's net result for checking on the Turn and betting on the River, where $Wr = \#$ wins, $Lr = \#$ losses, and $Wr1 = \#$ wins with less than a Flush.

Let $E(iic) = (Wc - Lc) * 3 + Wc1 * 2$ be the Player's net result for checking on the Turn and the River, where $Wc = \#$ wins, $Lc = \#$ losses, and $Wc1 = \#$ wins with less than a Flush.

If $E(iir) > E(iic)$, then the strategy is to make the River bet; otherwise, the Player should check. Accumulate the outcomes derived from the chosen strategy.

Let $E(IIr)$ be the sum of the chosen results of $E(iir)$ and $E(IIc)$ be the sum of the chosen results of $E(iic)$.

Next, determine whether to make the Turn bet by determining whether $E(IIr) + E(IIc) > E(Ir) + E(Ic)$

If it is, the strategy is to check on the Turn; otherwise, bet it.

5. As soon as step 4 is done, the Player's expectation for this three-card Flop and his two hole cards dealt from this five-card hand is properly weighted and added to the Player's two-card expectation for these two hole cards.
6. As soon as steps 1 thru 5 are done, the Player's expectation for each of 168 two-card starting hands can be determined. If the expectation is less than -1, then fold the hand.

Table A.1 and Table A.2 provide an example of the analysis of a two-card starting hand of an unsuited A-J:

Table A.1 Frequency Distribution - Check on the Turn

Result	Check on the River	Bet on the River	Total
Win	0.0332	0.0340	0.0672
Loss	6.2194	1.3509	7.5703
Tie	0.2844	0.0728	0.3571
Win with less than a Flush	4.1145	2.5235	6.6380
Total	10.6515	3.9812	14.6326

Player expectation: -8.0269%

Table A.2 Frequency Distribution - Bet on the Turn

Result	Check on the River	Bet on the River	Total
Win	0.0609	3.7172	3.7781
Loss	10.2786	17.5598	27.8383
Tie	0.2579	1.4411	1.6990
Win with less than a Flush	8.1510	43.9009	52.0519
Total	18.7484	66.6190	85.3673

Player expectation: 89.9730%

The overall Player expectation for the hand of an unsuited A-J is
 $89.9730\% - 8.0269\% = 81.9462\%$ on the Ante.

Table A.3 provides an analysis of the following

Five-card hand: 5 ♠, 5 ♥, 8 ♦, 9 ♦, J ♠

Player: holds 5 ♠ and 5 ♥

Flop: 8 ♦, 9 ♦, and J ♠

Table A.3 Player expectations in %

Turn bet	Check		Bet	
4 th community card	Check	Bet	Check	Bet
2 ♠	-56.8357	-59.5894	-59.5894	-62.3430
3 ♠	-56.8357	-59.5894	-59.5894	-62.3430
4 ♠	-56.8357	-59.5894	-59.5894	-62.3430
6 ♠	-73.6078	-83.2038	-83.2038	-92.7997
7 ♠	-92.9513	-111.6952	-111.6952	-130.4392
8 ♠	-59.0975	-66.3153	-66.3153	-73.5332
9 ♠	-57.7931	-64.5762	-64.5762	-71.3592
T ♠	-140.1098	-178.9943	-178.9943	-217.8788
Q ♠	-108.4914	-133.3180	-133.3180	-158.1445
K ♠	-89.1480	-104.8265	-104.8265	-120.5051
A ♠	-89.1480	-104.8265	-104.8265	-120.5051
2 ♥	-54.7826	-56.7150	-56.7150	-58.6473
3 ♥	-54.7826	-56.7150	-56.7150	-58.6473

Table A.3 Player expectations in % (Continued)

Turn bet	Check		Bet	
4 th community card	Check	Bet	Check	Bet
4 ♥	-54.7826	-56.7150	-56.7150	-58.6473
6 ♥	-71.4119	-80.1296	-80.1296	-88.8472
7 ♥	-91.0101	-108.9899	-108.9899	-126.9697
8 ♥	-56.6667	-62.9183	-62.9183	-69.1700
9 ♥	-55.3623	-61.1792	-61.1792	-66.9960
T ♥	-138.7527	-177.1190	-177.1190	-215.4853
J ♥	-56.7128	-62.9798	-62.9798	-69.2468
Q ♥	-106.6930	-130.8125	-130.8125	-154.9319
K ♥	-87.0949	-101.9521	-101.9521	-116.8094
A ♥	-87.0949	-101.9521	-101.9521	-116.8094
2 ♦	-84.6179	-98.4805	-98.4805	-112.3430
3 ♦	-84.6179	-98.4805	-98.4805	-112.3430
4 ♦	-84.6179	-98.4805	-98.4805	-112.3430
5 ♦	118.5968	177.5165	177.5165	236.4361
6 ♦	-101.1397	-121.7172	-121.7172	-142.2947
7 ♦	-117.4747	-145.8498	-145.8498	-174.2249
T ♦	-159.6794	-206.0935	-206.0935	-252.5077
J ♦	-86.1331	-104.1195	-104.1195	-122.1058
Q ♦	-132.5406	-166.8357	-166.8357	-201.1309
K ♦	-116.2055	-142.7031	-142.7031	-169.2007
A ♦	-116.2055	-142.7031	-142.7031	-169.2007
2 ♣	-54.7826	-56.7150	-56.7150	-58.6473
3 ♣	-54.7826	-56.7150	-56.7150	-58.6473
4 ♣	-54.7826	-56.7150	-56.7150	-58.6473
5 ♣	155.8366	229.6443	229.6443	303.4519
6 ♣	-71.4119	-80.1296	-80.1296	-88.8472
7 ♣	-91.0101	-108.9899	-108.9899	-126.9697

Table A.3 Player expectations in % (Continued)

Turn bet	Check		Bet	
4 th community card	Check	Bet	Check	Bet
8 ♣	-56.6667	-62.9183	-62.9183	-69.1700
9 ♣	-55.3623	-61.1792	-61.1792	-66.9960
T ♣	-138.7527	-177.1190	-177.1190	-215.4853
J ♣	-56.7128	-62.9798	-62.9798	-69.2468
Q ♣	-106.6930	-130.8125	-130.8125	-154.9319
K ♣	-87.0949	-101.9521	-101.9521	-116.8094
A ♣	-87.0949	-101.9521	-101.9521	-116.8094
Total	-80.7315	8.6630	-95.0711	11.4870
Overall Expectation	-72.0685		-83.5841	

Since not making the Turn bet will yield an expectation of -72.0685% as opposed to -83.5841%, the Player should check on the Turn.

The optimal strategy for the two-card hand is to fold an unsuited 2-3, 2-4, 2-5, 2-6, 2-7 and 3-4. The Player's expectation for each of the 168 starting two-card hands is shown below.

The five-card strategy is too complicated to enumerate here as there are $134,459 \times 10 = 1,344,590$ five-card hands composed of the Player's starting two hole cards and the three-card Flop.

The Player will fold 5.4299% of the time and his average bet will be 3.7939 units.

The house advantage is 5.5935% on the Ante or 1.4743% per total wager.

Base Game Math Analysis - Straight or Better

There are $C_{52,2} \times C_{50,3} \times C_{47,1} \times C_{46,1} \times C_{45,2} = 1,326 \times 19,600 \times 47 \times 46 \times 990 = 55,627,620,048,000$ ways to cycle through all possible hand combinations in PROGRESSIVE TEXAS HOLD 'EM POKER. A computer program known as a combinatorial analyzer was written to deal and evaluate all of the hands in order to determine the optimal strategy and the Player expectation. The algorithm for the analysis is described below.

1. First, the analyzer cycles through all 134,459 unique five-card hand combinations.
2. For each five-card hand, draw all $C_{47,2} = 1081$ two-card hands from the remaining 47-card deck. Combine each two-card hand with this five-card hand, determine the ranking of the complete seven-card hand, and save it in computer memory.
3. For each of $C_{5,3} = 10$ three-card flops that can be drawn from this five-card hand, let the remaining two cards be the Player's hole cards, draw two separate two-card hands from the saved 1081 pairs, and let one two-card hand be the Dealer's hole cards and the other two-card hand be the 4th and 5th community cards. Determine the outcome by comparing the Player's seven-card hand and the Dealer's seven-card hand using this three-card Flop and 4th and 5th community cards.



The ranking of the Player's seven-card hand has already been determined by step 2 and therefore can simply be retrieved from the computer memory where it was saved.

Record the outcome (number of wins, losses and ties) once for each of the two community cards, since either one can be the 4th community card that affects the Player's "check or bet" strategy. Now swap the Dealer's two hole cards with the 4th and 5th community cards, repeat the comparison and record the outcomes. The number of wins equal to or greater than a Straight and the number of wins less than a Straight are recorded separately.

4. As soon as all the 134,459 five-card hand combinations have been dealt and processed, retrieve the saved outcomes from the computer memory for each of the ten three-card flops for each five-card hand. For each such three-card Flop, retrieve the outcomes for each of the 47 4th community cards and determine the Player's expectation. When determining the Player's expectation, assume the Player (i) made the Turn bet and (ii) checked on Turn, respectively.

Let $E(ir) = (Wr - Lr) * 5 + Wr1 * 4$ be the Player's net result for betting on the Turn and the River, where $Wr = \#$ wins, $Lr = \#$ losses, and $Wr1 = \#$ wins with less than a Straight.

Let $E(ic) = (Wc - Lc) * 4 + Wc1 * 3$ be the Player's net result for betting on the Turn and checking on the River, where $Wc = \#$ wins, $Lc = \#$ losses, and $Wc1 = \#$ wins with less than a Straight.

If $E(ir) > E(ic)$, then the strategy is to make the River bet; otherwise, the Player should check. Accumulate the outcomes derived from the chosen strategy (result).

Let $E(Ir)$ be the sum of the chosen results of $E(ir)$ and $E(Ic)$ be the sum of the chosen results of $E(ic)$.

Next, let $E(iir) = (Wr - Lr) * 4 + Wr1 * 3$ be the Player's net result for checking on the Turn and betting on the River, where $Wr = \#$ wins, $Lr = \#$ losses, and $Wr1 = \#$ wins with less than a Straight.

Let $E(iic) = (Wc - Lc) * 3 + Wc1 * 2$ be the Player's net result for checking on the Turn and the River, where $Wc = \#$ wins, $Lc = \#$ losses, and $Wc1 = \#$ wins with less than a Straight.

If $E(iir) > E(iic)$, then the strategy is to make the River bet; otherwise, the Player should check. Accumulate the outcomes derived from the chosen strategy.

Let $E(IIr)$ be the sum of the chosen results of $E(iir)$ and $E(IIc)$ be the sum of the chosen results of $E(iic)$.

Next, determine whether to make the Turn bet by determining whether $E(IIr) + E(IIc) > E(Ir) + E(Ic)$

If it is, the strategy is to check on the Turn; otherwise, bet it.

5. As soon as step 4 is done, the Player's expectation for this three-card Flop and his two hole cards dealt from this five-card hand is properly weighted and added to the Player's two-card expectation for these two hole cards.
6. As soon as steps 1 thru 5 are done, the Player's expectation for each of 169 two-card starting hands can be determined. If the expectation is less than -1, then fold the hand.

Table A.4 and Table A.5 provide an example of the analysis of a two-card starting hand of an unsuited A-J:

Table A.4 Frequency Distribution - Check on the Turn

Result	Check on the River	Bet on the River	Total
Win	0.1875	0.0973	0.2848
Loss	6.2194	1.3509	7.5703
Tie	0.2844	0.0728	0.3571
Win with less than a Straight	3.9603	2.4601	6.4204
Total	10.6516	3.9811	14.6326

Player expectation: -7.8092%

Table A.5 Frequency Distribution - Bet on the Turn

Result	Check on the River	Bet on the River	Total
Win	0.5268	6.3369	6.8637
Loss	10.2786	17.5598	27.8383
Tie	0.2579	1.4411	1.6990
Win with less than a Straight	7.6851	41.2812	48.9663
Total	18.7484	66.6190	85.3673

Player expectation: 93.0586%

The overall Player expectation for the hand of an unsuited A-J is
 $93.0586\% - 7.8092\% = 85.2493\%$ on the Ante.

Table A.6 provides an analysis of the following

Five-card hand: 5 ♠, 5 ♥, 8 ♦, 9 ♦, J ♠

Player: holds 5 ♠ and 5 ♥

Flop: 8 ♦, 9 ♦, and J ♠

Table A.6 Player expectations in %

Turn bet	Check		Bet	
4 th community card	Check	Bet	Check	Bet
2 ♠	-56.8357	-59.5894	-59.5894	-62.3430
3 ♠	-56.8357	-59.5894	-59.5894	-62.3430
4 ♠	-56.8357	-59.5894	-59.5894	-62.3430
6 ♠	-67.2222	-76.8182	-76.8182	-86.4141
7 ♠	-86.5657	-105.3096	-105.3096	-124.0536
8 ♠	-59.0975	-66.3153	-66.3153	-73.5332
9 ♠	-57.7931	-64.5762	-64.5762	-71.3592
T ♠	-140.1098	-178.9943	-178.9943	-217.8788
Q ♠	-108.4914	-133.3180	-133.3180	-158.1445
K ♠	-89.1480	-104.8265	-104.8265	-120.5051
A ♠	-89.1480	-104.8265	-104.8265	-120.5051
2 ♥	-54.7826	-56.7150	-56.7150	-58.6473
3 ♥	-54.7826	-56.7150	-56.7150	-58.6473

Table A.6 Player expectations in % (Continued)

Turn bet	Check		Bet	
4 th community card	Check	Bet	Check	Bet
4 ♥	-54.7826	-56.7150	-56.7150	-58.6473
6 ♥	-64.9649	-73.6825	-73.6825	-82.4001
7 ♥	-84.5630	-102.5428	-102.5428	-120.5226
8 ♥	-56.6667	-62.9183	-62.9183	-69.1700
9 ♥	-55.3623	-61.1792	-61.1792	-66.9960
T ♥	-138.7527	-177.1190	-177.1190	-215.4853
J ♥	-56.7128	-62.9798	-62.9798	-69.2468
Q ♥	-106.6930	-130.8125	-130.8125	-154.9319
K ♥	-87.0949	-101.9521	-101.9521	-116.8094
A ♥	-87.0949	-101.9521	-101.9521	-116.8094
2 ♦	-84.6179	-98.4805	-98.4805	-112.3430
3 ♦	-84.6179	-98.4805	-98.4805	-112.3430
4 ♦	-84.6179	-98.4805	-98.4805	-112.3430
5 ♦	118.5968	177.5165	177.5165	236.4361
6 ♦	-95.3535	-115.9310	-115.9310	-136.5086
7 ♦	-111.6886	-140.0637	-140.0637	-168.4387
T ♦	-159.6794	-206.0935	-206.0935	-252.5077
J ♦	-86.1331	-104.1195	-104.1195	-122.1058
Q ♦	-132.5406	-166.8357	-166.8357	-201.1309
K ♦	-116.2055	-142.7031	-142.7031	-169.2007
A ♦	-116.2055	-142.7031	-142.7031	-169.2007
2 ♣	-54.7826	-56.7150	-56.7150	-58.6473
3 ♣	-54.7826	-56.7150	-56.7150	-58.6473
4 ♣	-54.7826	-56.7150	-56.7150	-58.6473
5 ♣	155.8366	229.6443	229.6443	303.4519
6 ♣	-64.9649	-73.6825	-73.6825	-82.4001
7 ♣	-84.5630	-102.5428	-102.5428	-120.5226

Table A.6 Player expectations in % (Continued)

Turn bet	Check		Bet	
4 th community card	Check	Bet	Check	Bet
8 ♣	-56.6667	-62.9183	-62.9183	-69.1700
9 ♣	-55.3623	-61.1792	-61.1792	-66.9960
T ♣	-138.7527	-177.1190	-177.1190	-215.4853
J ♣	-56.7128	-62.9798	-62.9798	-69.2468
Q ♣	-106.6930	-130.8125	-130.8125	-154.9319
K ♣	-87.0949	-101.9521	-101.9521	-116.8094
A ♣	-87.0949	-101.9521	-101.9521	-116.8094
Total	-79.6649	8.6630	-94.0045	11.4870
Overall Expectation	-71.0019		-82.5175	

Since not making the Turn bet will yield an expectation of -71.0019% as opposed to -82.5175%, the Player should check on the Turn.

The optimal strategy for the two-card hand is to fold an unsuited 2-3, 2-4, 2-5, 2-6 and 2-7. The Player's expectation for each of the 169 starting two-card hands is shown below.

The five-card strategy is too complicated to enumerate here as there are $134,459 \times 10 = 1,344,590$ five-card hands composed of the Player's starting two hole cards and the three-card Flop.

The Player will fold 4.5249% of the time and his average bet will be 3.8181 units.

The house advantage is 2.04% on the Ante or 0.53% per total wager.

Progressive Side Bet Math Analysis

Introduction

Each Player has the option of wagering on the progressive jackpot. At each Player position there is a coin acceptor where the Player may wager on the progressive jackpot for the upcoming hand. Rules for making a progressive jackpot wager:

1. The progressive wager is always treated as a side wager. Its payout is solely dependent upon the strength of the Player's winning hand.
2. A Player must place an initial wager to participate in the optional progressive jackpot wager.
3. Only one chip may be wagered per coin acceptor, per hand. The coin acceptor acknowledges only one chip per play. A Player may not wager another chip until the beginning of the next hand (GAME OVER pressed).
4. A Player choosing to play the progressive jackpot is responsible for noting that the coin acceptor LEDs are on.
5. A Player must make the progressive jackpot wager before the Dealer delivers the cards.
6. The progressive side bet wager is paid if the Player's first two cards and the first three community cards (a five-card hand) match any of the payout hands in the posted paytables.



The first three community cards are often referred to as the three-card Flop, or "the Flop."

The side bet is independent from base game plays so the Player's participation in the side bet need not cause a Player to alter their strategy as it relates to the base game. PGIC suggests the paytables beginning on the next page (PTHA-1 through PTHA-7) to be used for the side bet of PROGRESSIVE TEXAS HOLD 'EM POKER.

Probability Distribution, Hit Frequency, and House Advantage

The payouts, probability distribution, hit frequency, and house advantage for the progressive side bet of PROGRESSIVE TEXAS HOLD 'EM POKER are listed in Table A.7 through Table A.13.

Table A.7 PTHA-1 for the side bet of PROGRESSIVE TEXAS HOLD 'EM POKER

Bet	\$1				
Reserve Reset	\$10,000				
Fraction to House	30%				
Fraction to Meter	65%				
Fraction to Reserve	5%				
	Probabilities	1 in ~	Pay (X for 1)	Contribution	
Royal Flush	0.00000154	649740	100%		From Meter
Straight Flush	0.00001385	72202	10%		From Meter
Four of a Kind	0.00024010	4165	500	0.12005	From Meter
Full House	0.00144058	11111	100	0.14406	From Meter
Flush	0.00196540	509	50	0.09827	From Meter
Straight	0.00392465	255	0	0.00000	
Three of a Kind	0.02112845	47	0	0.00000	
Two Pair	0.04753902	21	0	0.00000	
One Pair	0.42256903	2	0	0.00000	
Nothing	0.50117738	2			
Hit Frequency	0.00366147	273.11	Fixed Pays	0.36238	
			Fixed Pays from Meter	0.36238	
			Fixed Pays not from Meter	0.00000	
			House Advantage	28.46%	
			Average Reset	\$42,487.00	
			Average Jackpot	\$120,726.22	

Table A.8 PTHA-2 for the side bet of PROGRESSIVE TEXAS HOLD 'EM POKER

Bet	\$1				
Reserve Reset	\$10,000				
Fraction to House	32%				
Fraction to Meter	53%				
Fraction to Reserve	15%				
	Probabilities	1 in ~	Pay (X for 1)	Contribution	
Royal Flush	0.00000154	649740	100%		From Meter
Straight Flush	0.00001385	72202	10%		From Meter
Four of a Kind	0.00024010	4165	500	0.12005	From Meter
Full House	0.00144058	694	100	0.14406	From Meter
Flush	0.00196540	509	50	0.09827	From Meter
Straight	0.00392465	255	10	0.03925	Not from Meter
Three of a Kind	0.02112845	47	3	0.06339	Not from Meter
Two Pair	0.04753902	21	2	0.09508	Not from Meter
One Pair	0.42256903	2	0	0.00000	
Nothing	0.50117738	2			
Hit Frequency	0.07625359	13.11	Fixed Pays	0.56009	
			Fixed Pays from Meter	0.36238	
			Fixed Pays not from Meter	0.19771	
			House Advantage	10.69%	
			Average Reset	\$107,461.01	
			Average Jackpot	\$113,886.46	

Table A.9 PTHA-3 for the side bet of PROGRESSIVE TEXAS HOLD 'EM POKER

Bet	\$1				
Reserve Reset	\$10,000				
Fraction to House	30%				
Fraction to Meter	65%				
Fraction to Reserve	5%				
	Probabilities	1 in ~	Pay (X for 1)	Contribution	
Royal Flush	0.00000154	649740	100%		From Meter
Straight Flush	0.00001385	72202	10%		From Meter
Four of a Kind	0.00024010	4165	500	0.12005	From Meter
Full House	0.00144058	694	100	0.14406	From Meter
Flush	0.00196540	509	50	0.09827	From Meter
Straight	0.00392465	255	10	0.03925	From Meter
Three of a Kind	0.02112845	47	5	0.10564	Not from Meter
Two Pair	0.04753902	21	0	0.00000	
One Pair	0.42256903	2	0	0.00000	
Nothing	0.50117738	2			
Hit Frequency	0.02871457	34.83	Fixed Pays	0.50727	
			Fixed Pays from Meter	0.40162	
			Fixed Pays not from Meter	0.10564	
			House Advantage	17.90%	
			Average Reset	\$42,487.00	
			Average Jackpot	\$107,304.38	

Table A.10 PTHA-4 for the side bet of PROGRESSIVE TEXAS HOLD 'EM POKER

Bet	\$1				
Reserve Reset	\$10,000				
Fraction to House	30%				
Fraction to Meter	65%				
Fraction to Reserve	5%				
	Probabilities	1 in ~	Pay (X for 1)	Contribution	
Royal Flush	0.00000154	649740	100%		From Meter
Straight Flush	0.00001385	72202	10%		From Meter
Four of a Kind	0.00024010	4165	500	0.12005	From Meter
Full House	0.00144058	694	100	0.14406	From Meter
Flush	0.00196540	509	50	0.09827	From Meter
Straight	0.00392465	255	10	0.03925	From Meter
Three of a Kind	0.02112845	47	3	0.06339	Not from Meter
Two Pair	0.04753902	21	2	0.09508	Not from Meter
One Pair	0.42256903	2	0	0.00000	
Nothing	0.50117738	2			
Hit Frequency	0.07625359	13.11	Fixed Pays	0.56009	
			Fixed Pays from Meter	0.40162	
			Fixed Pays not from Meter	0.15846	
			House Advantage	12.61%	
			Average Reset	\$42,487.00	
			Average Jackpot	\$107,304.38	

Table A.11 PTHA-5 for the side bet of PROGRESSIVE TEXAS HOLD 'EM POKER

Bet	\$1				
Reserve Reset	\$10,000				
Fraction to House	30%				
Fraction to Meter	65%				
Fraction to Reserve	5%				
	Probabilities	1 in ~	Pay (X for 1)	Contribution	
Royal Flush	0.00000154	649740	100%		From Meter
Straight Flush	0.00001385	72202	10%		From Meter
Four of a Kind	0.00024010	4165	500	0.12005	From Meter
Full House	0.00144058	694	100	0.14406	From Meter
Flush	0.00196540	509	50	0.09827	From Meter
Straight	0.00392465	255	10	0.03925	From Meter
Three of a Kind	0.02112845	47	5	0.10564	Not from Meter
Two Pair	0.04753902	21	2	0.09508	Not from Meter
One Pair	0.42256903	2	0	0.00000	
Nothing	0.50117738	2			
Hit Frequency	0.07625359	13.11	Fixed Pays	0.60234	
			Fixed Pays from Meter	0.40162	
			Fixed Pays not from Meter	0.20072	
			House Advantage	8.39%	
			Average Reset	\$42,487.00	
			Average Jackpot	\$107,304.38	

Table A.12 PTHA-6 for the side bet of PROGRESSIVE TEXAS HOLD 'EM POKER

Bet	\$5				
Reserve Reset	\$50,000				
Fraction to House	32%				
Fraction to Meter	53%				
Fraction to Reserve	15%				
	Probabilities	1 in ~	Pay (X for 1)	Contribution	
Royal Flush	0.00000154	649740	100%		From Meter
Straight Flush	0.00001385	72202	10%		From Meter
Four of a Kind	0.00024010	4165	2,500	0.60025	From Meter
Full House	0.00144058	694	500	0.72029	From Meter
Flush	0.00196540	509	250	0.49135	From Meter
Straight	0.00392465	255	50	0.19623	Not from Meter
Three of a Kind	0.02112845	47	15	0.31693	Not from Meter
Two Pair	0.04753902	21	10	0.47539	Not from Meter
One Pair	0.42256903	2	0	0.00000	
Nothing	0.50117738	2			
Hit Frequency	0.07625359	13.11	Fixed Pays	0.56009	
			Fixed Pays from Meter	0.36238	
			Fixed Pays not from Meter	0.19771	
			House Advantage	10.69%	
			Average Reset	\$537,305.05	
			Average Jackpot	\$569,432.29	

Table A.13 PTHA-7 for the side bet of PROGRESSIVE TEXAS HOLD 'EM POKER

Bet	\$5				
Reserve Reset	\$50,000				
Fraction to House	32%				
Fraction to Meter	53%				
Fraction to Reserve	15%				
	Probabilities	1 in ~	Pay (X for 1)	Contribution	
Royal Flush	0.00000154	649740	100%		From Meter
Straight Flush	0.00001385	72202	25,000	0.34625	From Meter
Four of a Kind	0.00024010	4165	2,500	0.60025	From Meter
Full House	0.00144058	694	500	0.72029	From Meter
Flush	0.00196540	509	250	0.49135	From Meter
Straight	0.00392465	255	50	0.19623	Not from Meter
Three of a Kind	0.02112845	47	15	0.31693	Not from Meter
Two Pair	0.04753902	21	10	0.47539	Not from Meter
One Pair	0.42256903	2	0	0.00000	
Nothing	0.50117738	2			
Hit Frequency	0.07625359	13.11	Fixed Pays	0.62934	
			Fixed Pays from Meter	0.43163	
			Fixed Pays not from Meter	0.19771	
			House Advantage	10.69%	
			Average Reset	\$537,305.05	
			Average Jackpot	\$856,886.21	

Glossary

action button (lammer or puck)	Marker or puck used to indicate the first Player to receive cards in that hand. Traditionally rotated in a clockwise manner after each round of play (hand) is completed.
Ante	First wager a Player places to receive card for that hand (round of play)
board (board cards)	Community cards placed face up in the center of the table. Used to complete both Player's and Dealer's hands alike; the same card(s) can be used for the Player and the Dealer at the same time. "Playing the Board" means declaring all five community cards as the five-card hand being played (and not using the two-card hand or hole cards).
Bonus (wager or payable)	Optional wager (bet) a Player can make where the bet can be based on an outcome other than the base game. Bonus payable is a schedule of payouts for the Bonus wager/bet. Players can lose on the base game and still qualify to be paid on a Bonus wager.
burn	To remove and discard (into the "muck") the top card from the deck, face down. This is done before the Flop and between each betting round, before dealing the next community card(s) face up. This is a game protection/security measure.
community cards	Consists of the three-card Flop, the Turn Card (one card), and the River Card (one card). Both Player and Dealer alike can use the same community cards within the same round of play in order to create the best possible hand.
facing	Publicly exposing, or turning over, the cards for all to see.
Flop	First three community cards displayed face up, at the same time, for all to use in creating their best hand.
heads-up (heads-up play)	One against one. In a traditional poker game that starts out with 9 or 10 Players, all but the last two Players may drop out. The last two Players are then playing "heads-up." In TEXAS HOLD 'EM BONUS POKER, each Player plays "heads-up" against the Dealer (House); there is no Player-to-Player competition.
hole cards (in the hole)	Player or Dealer's two-card hand which remains face down during play then turned face up and settled by the Dealer at the end of each round of play. A Player holding two sevens is said to have "a pair of sevens in the hole."

kicker	Unpaired card used to determine the better of two near-equivalent hands. The tiebreaking card. Example: Player has A-K and the Dealer has A-Q. If the community cards are 2-4-6-8-A (unsuited), both Player and Dealer each have a pair of Aces, but the Player wins with a King (K) “kicker.”
lammer (check lammer)	Circular plastic button (with a word, number or symbol on it) approximately 75% the size of a gaming cheque. Check lammer indicates that a Player elects not to wager/bet that particular round.
muck	Collection of cards no longer “in play”, either from discarded Player’s hands or “burn” cards discarded prior to disclosing community cards. After the last community card (the River) is placed face up on the board, the remaining unused portion of the deck is discarded into the “muck” by the Dealer. The word “muck” may also be used to describe the act of picking up chips. In a different context, it means to add or subtract chips from a wager illegally, or to illegally introduce additional cards to a game.
puck (lammer)	Marker used to mark a number or position, as in an action button. A lammer is traditionally smaller than a puck. Lammers can be clear or in colors, with or without wording or numbers (5, 10, 500, Action, Dealer, etc.). In some games the words button, puck, and lammer are interchangeable.
River or River Card	Fifth and final community card displayed for all to use.
Showdown	Act of determining the winner after all cards are dealt and all bets are made. The final outcome of the hand where the winner is decided based on the best poker ranked hand.
Turn or Turn Card	Fourth community card displayed for all to use.